

In re Application of Alfred S. Gates, Jr. et al.)
Serial No. 10/799,827)
Filed: March 12, 2004)

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Examiner: Turner, Archene A.

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REMARKS

Introduction

This paper is fully responsive to the issues in the pending Office Action mailed on February 7, 2007. Applicants submit that the pending claims are allowable over the references of record, and solicit the issuance of a Notice of Allowance and Issue Fee Due and Notice of Allowability.

The statutory basis for some of the rejections is 35 USC §102(b) and the statutory basis for the balance of the rejections is 35 USC §103(a). This response will first address the rejections under 35 USC §102(b) and then address the rejections under 35 USC §103(a).

Rejections under 35 USC §102(b)

The Law of Inherent Anticipation

Applicants wish to point out several important aspects of the current state of the law of inherent anticipation as set forth at MPEP 2112 IV, pages 2100-47 through 2100-48 (Rev. 5 Aug. 2006). These aspects are set forth below:

- The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993)
- To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference. In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)
- The mere fact that a certain thing may result from a given set of circumstances is not sufficient. In re Robertson, supra.
- An invitation to investigate is not an inherent disclosure when a prior art reference discloses no more than a broad genus of potential applications of

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its discoveries. Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings, 370 F.3d 1354, 71 USPQ2d 1081 (Fed. Cir. 2004).

Paragraph 2 Rejection – under 35 USC §102(b)

Via Paragraph 2 at page 2 of the FINAL Office Action, the Examiner has rejected claims 1-2, 4-6, 22, 23, 29-30 under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,980,988 to Ljungberg. The Examiner writes that, “[T]he rejection is maintained for reasons of record in the previous Office action.” The essence of the basis in the previous Office Action was that the, “... morphology of the alumina layer is considered inherent to the way the layer is made.” Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

In reference to claims 1, 2 and 4-6 applicants have amended claim 1 to recite that the coating scheme includes a modification coating layer, an intermediate coating layer and a base coating layer on the substrate generally along the lines of now cancelled claim 3. Applicants submit that even when taken in its totality, Ljungberg does not disclose the recitations of claim 1 in light of this amendment since Ljungberg does not disclose these additional coating layers added by the amendment. Since the Examiner also rejected claim 3, applicants will comment on the references (i.e., the Colombier et al. article and the ‘569 Ruppi patent) used to address claim 3 (now cancelled).

Neither the article to Colombier et al. nor the Ruppi patent address the specific multi-layer scheme now set forth in claim 1. These limitations pertain to a multi-layer coating scheme with a recited base coating layer, a recited intermediate coating layer on the base coating layer, a recited modification coating layer on the intermediate coating layer, and the alpha-alumina coating layer on the modification coating layer. After mentioning a coating scheme that comprises “multilayer alternating several TiC, Al₂O₃ or TiN layers” to achieve a fine grain size, at page 462, Colombier et al. reads:

The aim of this work is to study in more detail the possibilities of combining two refractory materials within a coating in a different way. This will not be done as a “multilayer” but as a “mixed layer”, i.e., the

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deposition of both phases occurs simultaneously side by side in a compacted layer.

Emphasis added.

At page 468, the article concludes:

The coatings consist of relatively large, faceted of α - Al_2O_3 crystals containing some titanium and surrounded by a fine grained titanium oxycarbide matrix. Two main titanium-oxycarbide compositions were found.

This is consistent with the abstract of the article, which reads [in part]:

Al_2O_3 and Ti(C,O) were codeposited as a mixed chemical vapour deposition (CVD) layer from AlCl_3 - TiCl_4 - CH_4 - H_2 gas mixture on cemented carbides and pure alumina substrates.

Applicants submit that Colmbier et al. does not address a coating scheme as claimed in claim 1 in which the alpha-alumina is applied to the modification layer and wherein the coating scheme contains the other the layers as set forth in claim 1.

The '569 Ruppi patent does not appear to address the multiple coating layer scheme as set forth in claim 1 wherein the alumina is the alpha-alumina phase and the first alpha-alumina layer is applied to the modification layer. This is so because '569 Ruppi seems to focus the teachings on the formation of kappa-alumina. Example 1 discloses nine separate layers of κ -alumina formed at a temperature equal to 1000°C. Also, '569 Ruppi expressly teaches away from applying the first kappa-alumina layer on the modification layer. In this regard, at Column 2, lines 48-62, the '569 Ruppi patent reads:

While the layers may be simply applied one on top of the other, it has been found that when κ -alumina is the desired form of the aluminum to be deposited, that the surface of the underlying alumina layer (whether α or κ) should contain a thin modification layer to insure the nucleation of κ -aluminum as the next coating. **A modification layer is not necessary (and is generally deleterious to adhesion) between the thin intermediate layer (e.g., TiC, TiN, and/or Ti(C,N) and the first κ -alumina layer.**

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There is a bonding layer between the intermediate layer and the κ -alumina layer on the substrate after the heat treatment, e.g., the bonding layer can be any of the materials which would help adhere and the knowledge of which is in the purview of one of ordinary skilled in the art.

Emphasis added.

Overall, it seems clear that the '569 Ruppi patent does not address claim 1.

Claims 2 and 4-6 depend from claim 1, and are allowable for the reasons advanced in support of claim 1.

In reference to claims 29-30, claim 29 recites that the coating scheme includes a base coating of alumina on the substrate. Applicants submit that Ljungberg does not disclose this base coating. Further, when addressing the recitation of a base coating layer of alumina in Paragraph 6 of the Office Action, the Examiner essentially stated (using the rationale from the earlier Office Action) that the use of an alumina base layer, "... is known in the coating art to provide additional performance of the coated substrate ...". Applicants respectfully submit that the Examiner must cite support for this conclusion. For the above reasons, applicants submit that claim 29 is allowable. Applicants have cancelled claim 30 so the rejection thereof is moot.

In reference to claim 22 and 23, independent claim 22 calls for the alumina coating layer as follows with an emphasis on the deposition temperature (emphasis added by author):

... a coating scheme on the substrate wherein the coating scheme includes an alumina coating layer selected from the group comprising an alpha-alumina coating layer having a platelet grain morphology at the surface thereof and a kappa-alumina coating layer having either a lenticular grain morphology at the surface thereof or a polyhedra-lenticular grain morphology at the surface thereof and a kappa-alpha-alumina coating layer having either a large multifaceted grain morphology at the surface thereof or a polyhedra-multifaceted grain morphology at the surface thereof, and **the coating layer being applied by chemical vapor deposition at a**

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temperature ranging between about 750 degrees Centigrade and less than about 850 degrees Centigrade.

In regard to the deposition temperatures of Ljungberg, the general disclosure recites the CVD temperature range as 850 °C to 1100 °C and the specific example (i.e., Example 1) calls for a temperature of 1000 °C-1030 °C (see the table at Column 4). Claim 22 calls for a deposition temperature range not addressed by Ljungberg. Thus, applicants submit that Ljungberg cannot anticipate the invention per claim 22..

Claim 23 depends from claim 22, and is allowable for the reasons advanced in support of claim 22.

Paragraph 3 Rejection – under 35 USC §102(b)

The Examiner has rejected claims 8-9, 11,13, 14, 22, 24 and 29-30 under 35 USC §102(b) as being anticipated by the article to Ruppi et al. entitled Chemical vapour deposition of κ - Al_2O_3 . The Examiner writes that, “[T]he rejection is maintained for reasons of record in the previous Office action.” In the earlier Office Action (June 16, 2006), the essence of the reasoning behind the rejection was that, “[T]he morphology of the alumina layer is considered inherent to the way the layer is made.” Applicants respectfully submit that the reasoning is in error and that these claims define allowable subject matter for the reasons set forth below.

The Ruppi et al. article pertains to the formation of a kappa-alumina coating layer. According to the article itself, “[T]he aim of this paper is to elucidate the influence of the process parameters (in this case the influence of H_2S doping, deposition temperature and the total pressure) on the growth and microstructure of κ - Al_2O_3 . See page 51 of the Ruppi et al. article. In regard to the morphology of the κ - Al_2O_3 , Ruppi et al., discloses that:

CVD κ - Al_2O_3 coatings are composed of columnar grains, the favoured growth direction being along 001. The columnar κ - Al_2O_3 coatings can be deposited to a considerable thickness ($> 10 \mu\text{m}$), without any changes in the phase content or crystallinity.

At page 58, the Ruppi et al. article states:

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All the κ - Al_2O_3 coatings deposited at different process conditions exhibited the typical columnar structure of κ - Al_2O_3 [3, 18], with grains that could be oriented throughout several layers.

Applicants submit that the “bottom line” of the Ruppi et al. article is that all it discloses is that the κ - Al_2O_3 coating layers exhibit columnar grain morphology since as set forth in the conclusions, the various parameters, “... did not effect the general microstructure or morphology of κ - Al_2O_3 .” See page 60. Here, applicants believe that all that one can determine from the term “columnar” is that the growth is generally perpendicular to the surface of the substrate. This term merely describes a general characteristic about the alumina and is not a description of the specific grain morphology.

Claim 8 recites the coating as follows:

... a kappa-alumina coating layer that exhibits either a lenticular grain morphology or a polyhedra-lenticular grain morphology at the surface of the kappa-alumina coating layer.

This claim calls out that the kappa-alumina coating layer must exhibit one of two grain morphologies. Based upon the face of the Ruppi et al. article, the columnar grain morphology of the Ruppi et al, article cannot be said to be either “lenticular” or “polyhedra-lenticular”. The Examiner cannot properly argue that columnar grains necessarily disclose the grain structure as set forth in the claim for the kappa-alumina coating. Thus, applicants submit that the Ruppi et al. article cannot inherently anticipate the claimed invention of claim 8.

Claims 9, 11, 13 and 14 depend from claim 8, and applicants submit these claims are allowable for the reasons advanced in support of claim 8. In addition, claim 14 calls for a base coating layer of alumina. The Ruppi et al does not disclose this aspect, and thus, applicants submit that Ruppi et al. cannot anticipate claim 14.

Independent claim 29 calls for, as one alternative:

... a kappa-alumina coating layer having either a lenticular grain morphology at the surface thereof or a polyhedra-lenticular grain morphology at the surface thereof, ...

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As discussed above, this is distinct from the Ruppi et al article, which on its face discloses columnar grain morphology of κ - Al_2O_3 . The Examiner cannot properly argue that columnar grains necessarily disclose the grain structure as set forth in the claim for the kappa-alumina coating. Further, claim 29 calls for a base coating layer of alumina. As mentioned above in conjunction with the discussion of claim 14, Ruppi et al. does not disclose this feature. Claim 29 defines allowable subject matter. Claim 30 stands cancelled so the rejection thereof is moot.

Claim 22 calls for coating layers wherein each different coating layer requires certain grain morphology. These coating morphologies are along the lines of those set forth in claim 29. For reasons like those set forth in connection with the argument in support of claim 29 regarding the kappa alumina coating layer, applicants submit that claim 22 is allowable over the Ruppi et al. article.

Claim 24 depends from claim 22 and specifies that the coating is kappa alumina. Claim 24 should be allowable for all of the reasons advanced in support of claim 22.

Paragraph 4 Rejection – under 35 USC §102(b)

The Examiner has rejected claims 15, 16, 22 and 25 as being anticipated under 35 USC §102(b) by the article to Yi-Feng Su et al. (hereinafter Su et al.). The Examiner writes that, “[T]he rejection is maintained for reasons of record in the previous Office action.” The rationale as set forth in the earlier Office Action of June 16, 2006 was that, “[Y]i-Feng et al discloses the claimed alumina layer on a substrate. The morphology of the alumina layer is considered inherent to the way the layer is made.” Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

The Su et al. article pertains to formation of an α - Al_2O_3 coating layer on a platinum interlayer wherein the application appears to be with regard to thermal barrier coatings in “hot section” turbine components in revenue-generating aircraft. At page 2095, the article concluded that:

The characterization results showed that the phase contents and morphology of the CVD- Al_2O_3 coating were strongly dictated by the

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substrate. The coating directly deposited on René N5 consisted of α -Al₂O₃ crystals of ≈ 0.5 -1.5 μ m in a glassy, discontinuous matrix phase of amorphous α -Al₂O₃. On the other hand, the coating on Pt-plated René N5 contained α -Al₂O₃ crystals of ≈ 0.1 -1 μ m and with a minute amount of κ -Al₂O₃. The coating on pure Pt was a κ -Al₂O₃ along with a trace amount of α -Al₂O₃, but with the formation of a major amount of Pt₃Al at the coating/substrate interface.

Claim 15 calls for:

... a coating scheme on the substrate wherein the coating scheme includes a kappa-alpha alumina coating layer that contains alpha-alumina and kappa-alumina, and wherein the kappa-alpha coating layer exhibits either a large multifaceted grain morphology or a polyhedra-multifaceted grain morphology at the surface of the alumina coating layer.

Claim 15 requires that the coating contain both alpha-alumina and kappa-alumina and exhibit a particular grain morphology. Su et al. discloses a coating on pure Pt that is comprised of κ -Al₂O₃ along with a trace amount of α -Al₂O₃, as well as a coating on Pt-plated René N5 a coating comprising α -Al₂O₃ along with a "minute" amount of κ -Al₂O₃. Applicants submit that a document that teaches what Su et al. teaches cannot anticipate the claimed invention of claim 15 which also recites the grain morphology.

There is nothing in Su et al. that addresses the grain morphology, i.e., "...the coating layer exhibits either a large multifaceted grain morphology or a polyhedra-multifaceted grain morphology at the surface of the alumina coating layer..." Applicants respectfully submit that Su et al. cannot anticipate the invention per claim 15.

Claim 16 depends from claim 15 and is allowable for all of the reasons advanced in support of claim 15. Further, Table I in Su et al. shows a temperature equal to 1020 °C. Clearly, this is not within the range of 750-920 °C called for by claim 16. In addition to the fact that claim 16 depends from claim 15, claim 16 also calls out a temperature range not addressed by Su et al. and thus is allowable for Su et al.

Claim 22 calls for the coating layer to be applied:

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... and the coating layer being applied by chemical vapor deposition at a temperature ranging between about 750 degrees Centigrade and less than about 850 degrees Centigrade.

As set forth above, Table I of Su et al. recites a temperature equal to 1020 °C. Clearly, this is not within the range of about 750°C - less than about 850°C called for by claim 22. It seems clear that Su et al. cannot anticipate claim 22.

Claim 25 depends from claim 22 and is allowable for all of the reasons advanced in support of claim 22. Further, the fact that Sue et al. teaches only a "trace" of $\alpha\text{-Al}_2\text{O}_3$ supports the position that Su et al. cannot anticipate claim 25 which calls for an alpha-kappa alumina coating layer.

Rejections under 35 USC §103(a)

Paragraph 6 Rejection under 35 USC §103(a)

The Examiner has rejected claim 7 as being unpatentable under 35 USC §103(a) over Ljungberg alone. Claim 7 depends from claim 1. Claim 7 is allowable for the reasons advanced in support of claim 1. Also, Ljungberg does not disclose the base coating layer of alumina. Applicants submit that claim 7 is allowable over Ljungberg.

Paragraph 7 Rejection under 35 USC §103(a)

The Examiner has rejected claim 3 as being unpatentable under 35 USC §103(a) over Ljungberg taken in view of the article by Colombier et al. or U.S. Patent No. 5,700,569 to Ruppi et al. Claim 3 stands cancelled so that the rejection is moot.

Paragraph 8 Rejection under 35 USC §103(a)

The Examiner has rejected claim 12 as being unpatentable under 35 USC §103(a) over the article to Ruppi. Applicants respectfully submit that claim 12 is allowable because it depends from allowable claim 8.

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Paragraph 9 Rejection under 35 USC §103(a)

The Examiner has rejected claim 10 as being unpatentable under 35 USC §103(a) over the article to Ruppi taken in view of the article to Colmbier et al. or the '569 Ruppi patent . Applicants respectfully submit that this claim defines allowable subject matter for the reasons set forth below.

Claim 10 depends from claim 8 and is allowable for all of the reasons advanced in support of claim 8. Further, for reasons like those set forth in support of claim 1 regarding the presence of the modification coating layer, the intermediate coating layer and the base coating layer, applicants submit that claim 10 allowable over the combination Colmbier et al. and the '569 Ruppi patent.

Paragraph 10 Rejection under 35 USC §103(a)

The Examiner has rejected claims 18-21 as being unpatentable under 35 USC §103(a) over the article to Su et al. alone. Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

First, claims 18-21 depend from claim 15, and hence, are allowable for all of the reasons advanced in support of claim 15.

Second, Su et al. does not address any of the substrates listed in claim 18. In the absence of any suggestion of such a substrate, especially in light of the fact that Su et al teaches the impact of the substrate upon the coating, renders Su et al. ineffective as a reference against claim 18.

Third, Su et al. does not address a cutting insert, but instead, addresses a part of a turbine. This difference causes Su et al. to not address claim 19.

Fourth, Su et al. does not teach coating layers on the principal coating layer. Thus, it cannot render claim 20 unpatentable.

Fifth, Su et al. does not teach or suggest a base coating layer of alumina. Thus, it cannot render claim 21 unpatentable.

For the above reasons, applicants request the removal of these rejections and the allowance of these claims.

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Paragraph 11 Rejection under 35 USC §103(a)

The Examiner has rejected claim 17 as being unpatentable under 35 USC §103(a) over the article to Su et al. taken in view of the article to Colmbier et al. or the '569 Ruppi patent. Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

Claim 17 depends from claim 15, and thus, is allowable for the reasons advanced in support of claim 15. In addition, applicants reiterate the arguments against Colmbier et al. and the '569 Ruppi patent as expressed in support of claim 1 to support the position that these secondary documents cannot teach or suggest the multiple coating layer scheme of claim 17. Applicants request the removal of the rejection and the allowance of claim 17.

New Claim 31

New claim 31 depends from claim 1. Claim 31 should be allowable for the reasons advanced in support of claim 1.

Supplemental Information Disclosure Statement

Applicants point out that a Supplemental Information Disclosure Statement accompanies the RCE.

Conclusion

Applicants submit that the claims define allowable subject matter. Applicants solicit the issuance of a Notice of Allowance and Issue Fee Due and Notice of Allowability. If the Examiner disagrees with the arguments, but has suggestions to place

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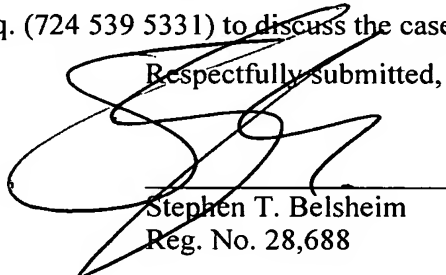
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the claims in form for allowance, applicants urge the Examiner to contact the undersigned (615 662 0100) or Mr. John J. Prizzi, Esq. (724 539 5331) to discuss the case.

Respectfully submitted,

A large, stylized handwritten signature in black ink, appearing to read 'S. Belsheim', is written over the typed name and registration number.

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